Casualty Actuaries of the Northwest: Strategies for Homeowners Profitability and Growth

Nancy Watkins, FCAS, MAAA
Principal and Consulting Actuary
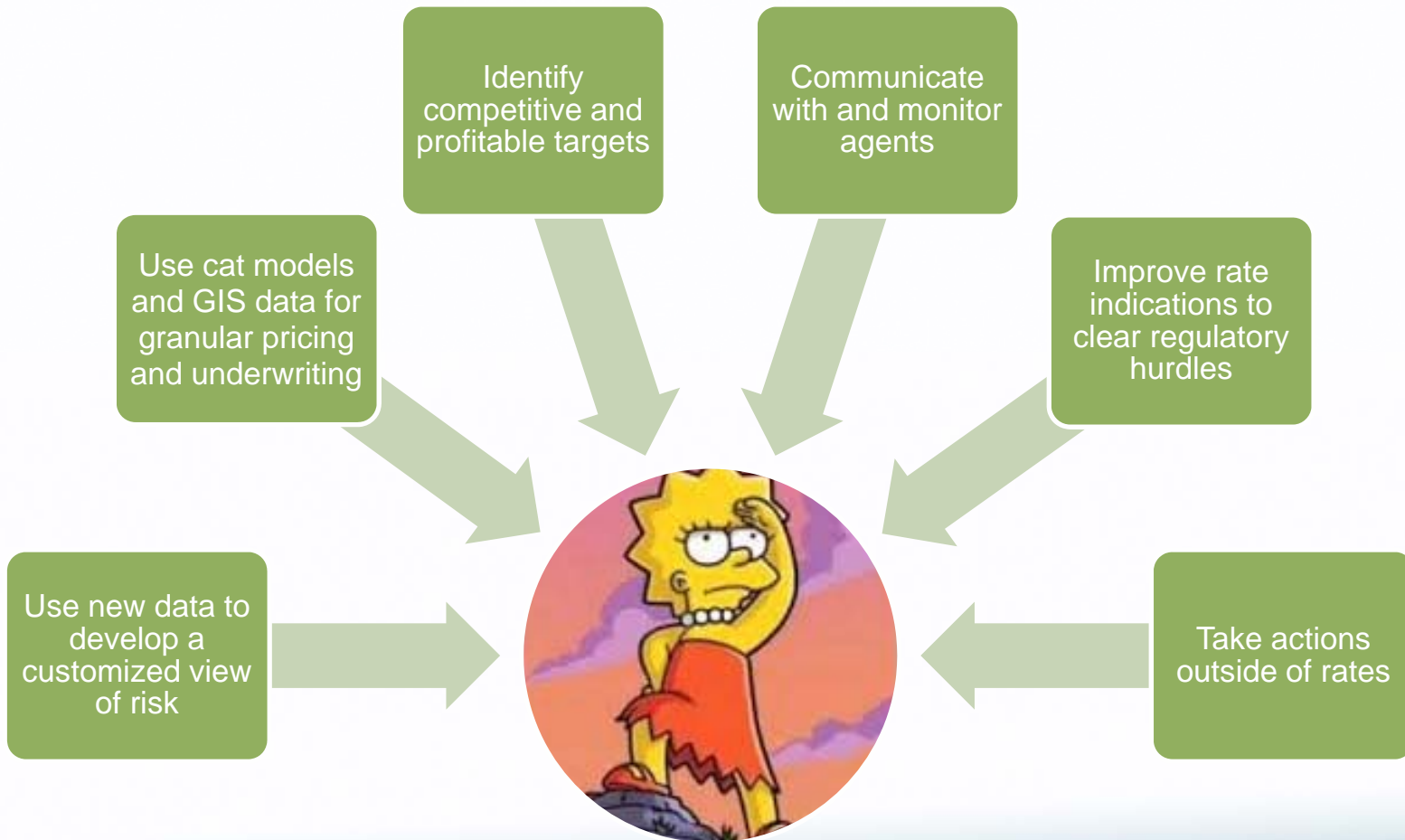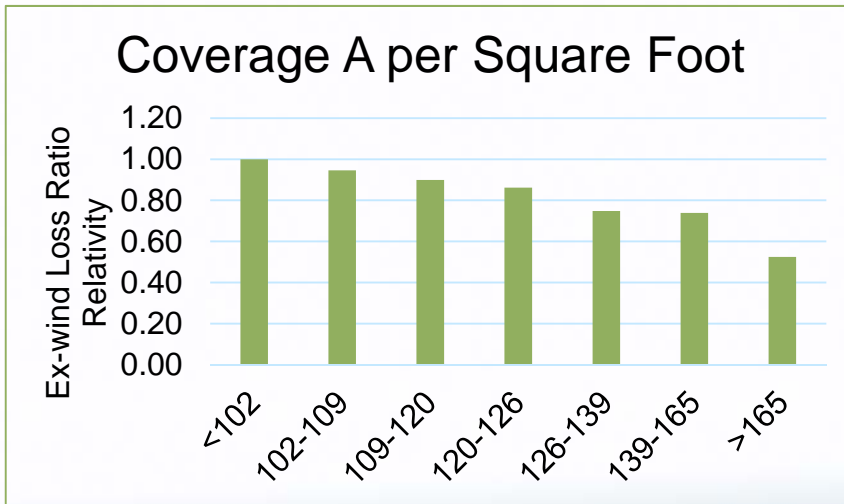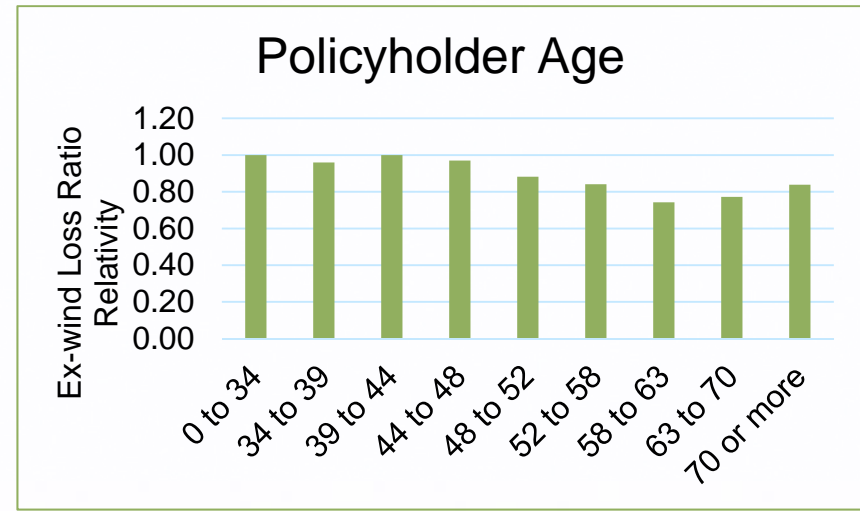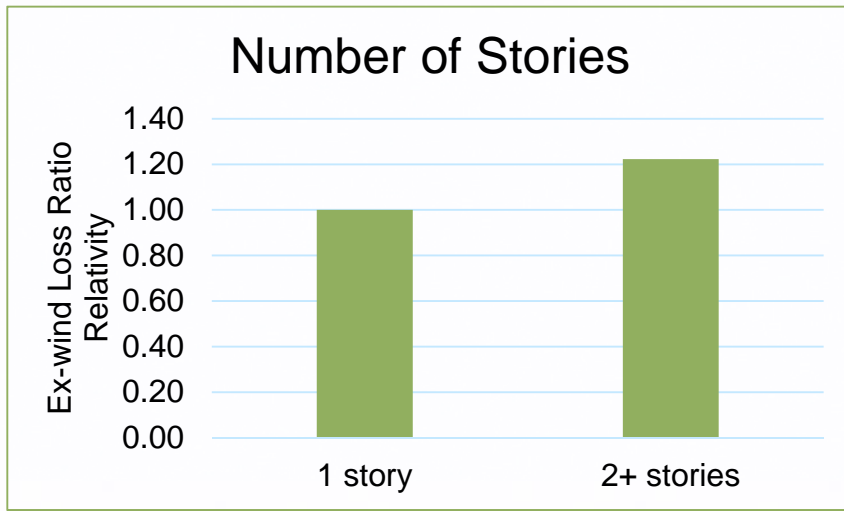Milliman, Inc.

September 25, 2015

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Why is Homeowners so challenging?

Strategies for integrated approach to risk

Identify competitive and profitable targets

Communicate with and monitor agents

Use cat models and GIS data for granular pricing and underwriting

Improve rate indications to clear regulatory hurdles

Use new data to develop a customized view of risk

Take actions outside of rates

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Use the data you already have

Number of Stories

Policyholder Age

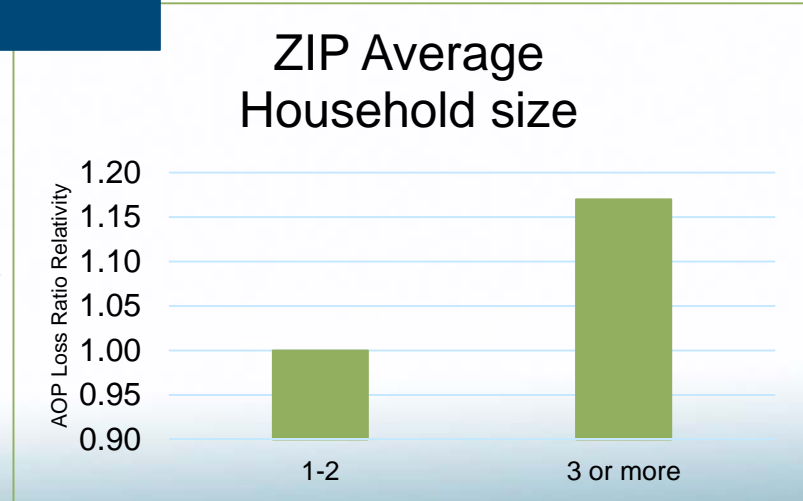Coverage A per Square Foot

Find new insights within company data

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Use data from third party sources

Population Density
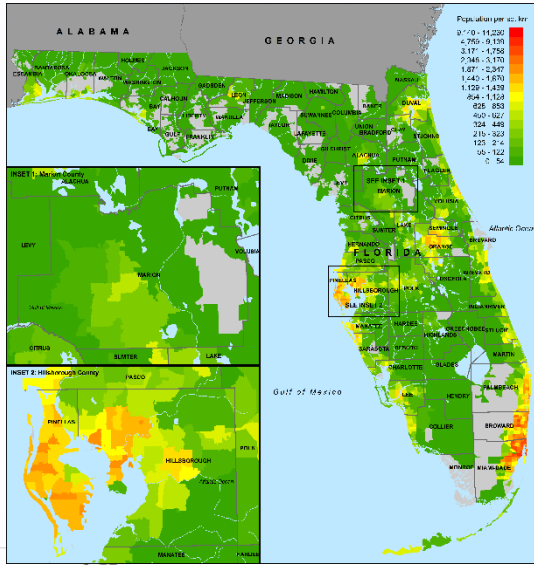
Buildfax

Population Density

Tree Proximity & Wind/Hail Loss in Texas
Wind/Hail Loss Ratio by Home Age

Find other objective data that aligns with risk

Mortgage data

Mortgage data

Census

ZIP Average Household size

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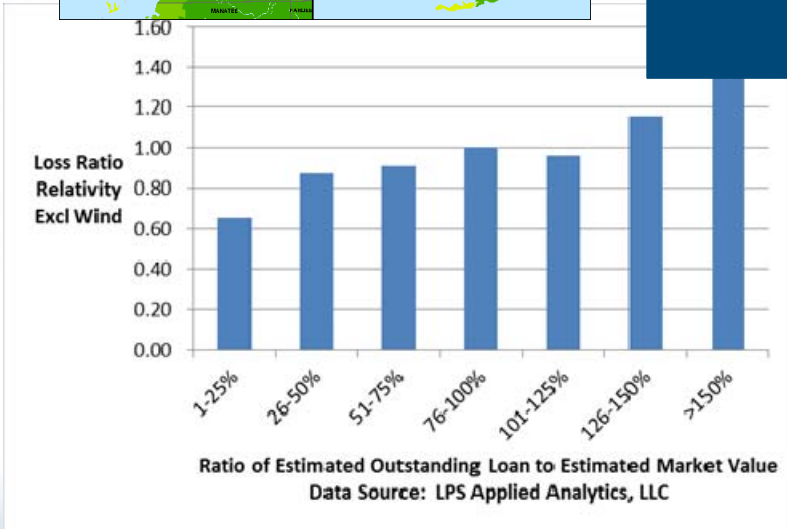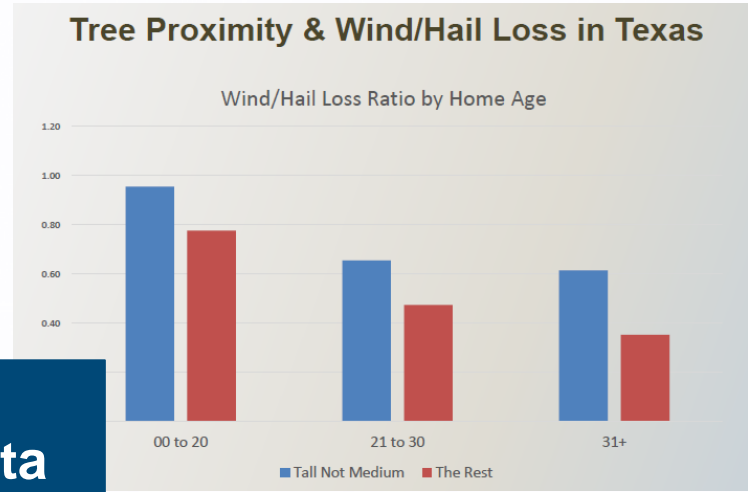
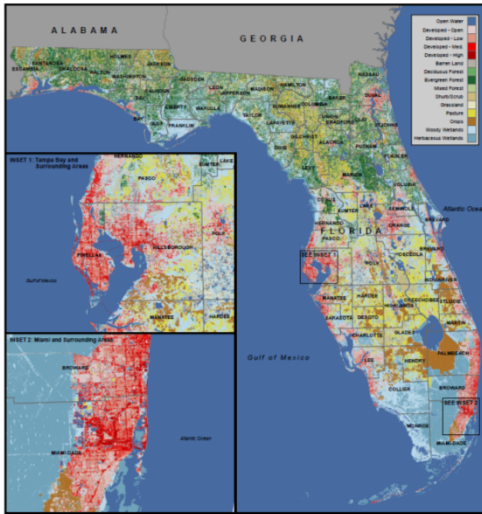# Use Geographic Information Systems data

Example: Hurricane

Land Use/Land Cover

Note:
1. Source: National Land Cover Dataset (2006) from the United States Geological Survey.

Effective Surface Roughness

Note:
1. Effective surface roughness length (m) estimated by Milliman using the National Land Cover Dataset (2006) from the United States Geological Survey.

Coastline

Distance to Coast

Note:
1. Distance to coast calculated from Milliman's coastline.
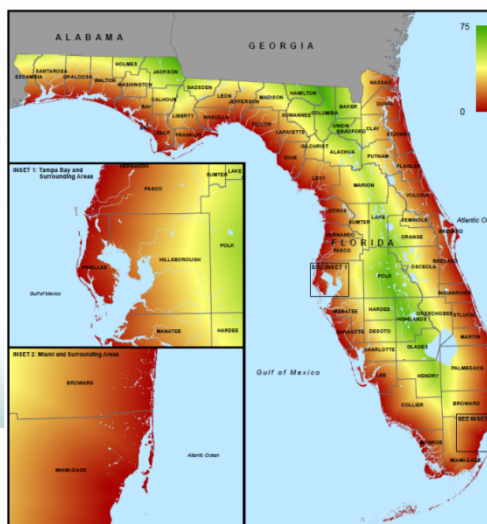
Start with GIS data, such as land use/land cover and a coastline

Use these to prepare predictor variables, such as effective surface roughness and distance to coast

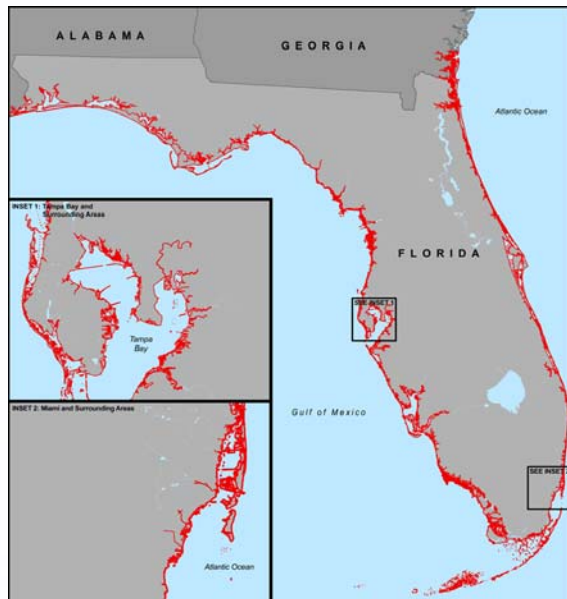**Milliman**

Use Catastrophe Model Output For Granular Pricing

Combine new predictor variables with catastrophe model output to model relationships to hurricane burn rate

Hurricane AAL / Coverage in $1000's

Example: Storm surge

NOAA Shoreline

Elevation
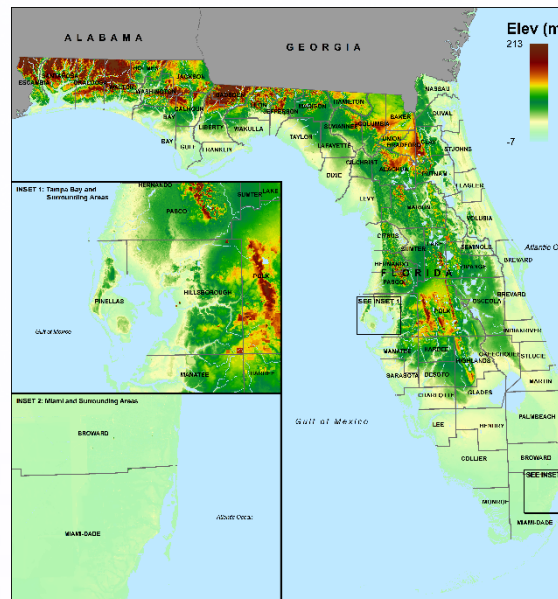
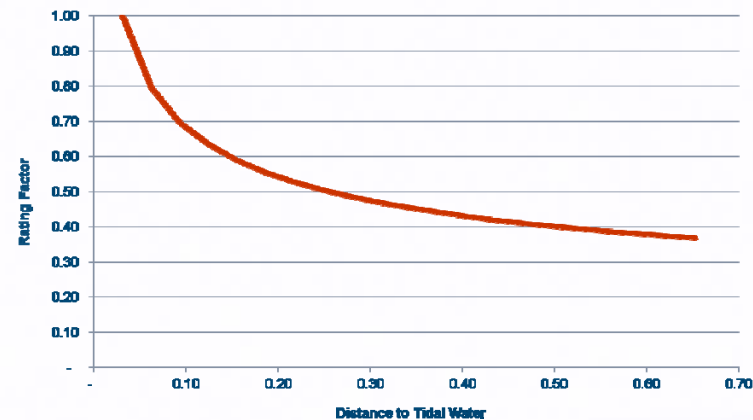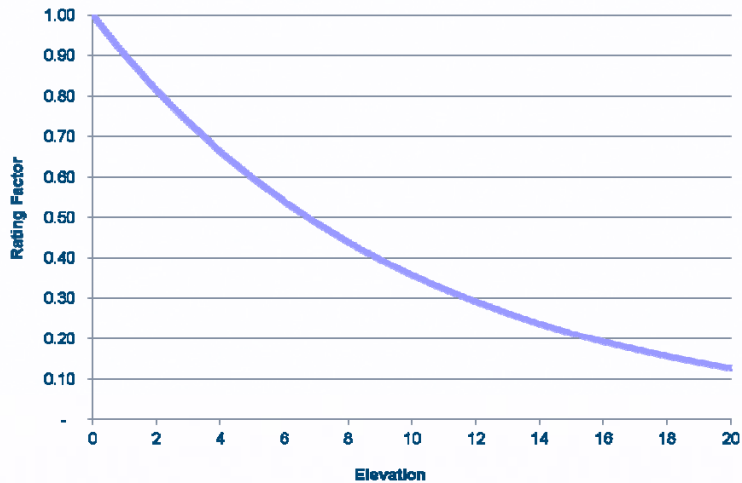**Start with GIS data, such as elevation, coastline, stream/river locations**

Use these to prepare predictor variables

Refine storm surge risk assessment

Combine with cat model output to refine underwriting rules for excessive storm surge risk, e.g. minimum permissible elevation given the distance to tidal water

Example of ineligible locations

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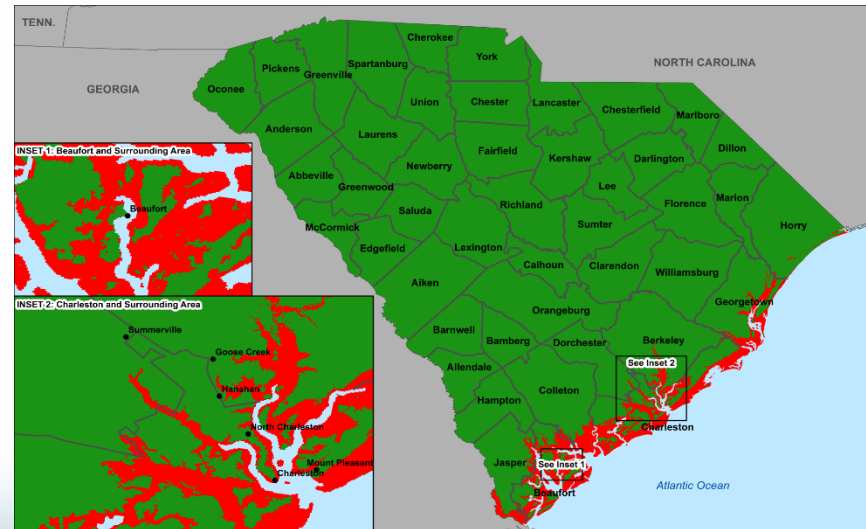
Example: Flood

- Target variables:
  - Storm surge AAL
  - Inland flood AAL

- Predictor variables:
  - Relative Elevation
  - Distance to Mean High Water Line
  - Distance to River/Stream
  - (Grouped) Hydrological Unit

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Pricing Flood: the Risk is Continuous

**Traditional Flood Zone Rating
(NFIP Flood Zones)**

Continuous Flood Rating

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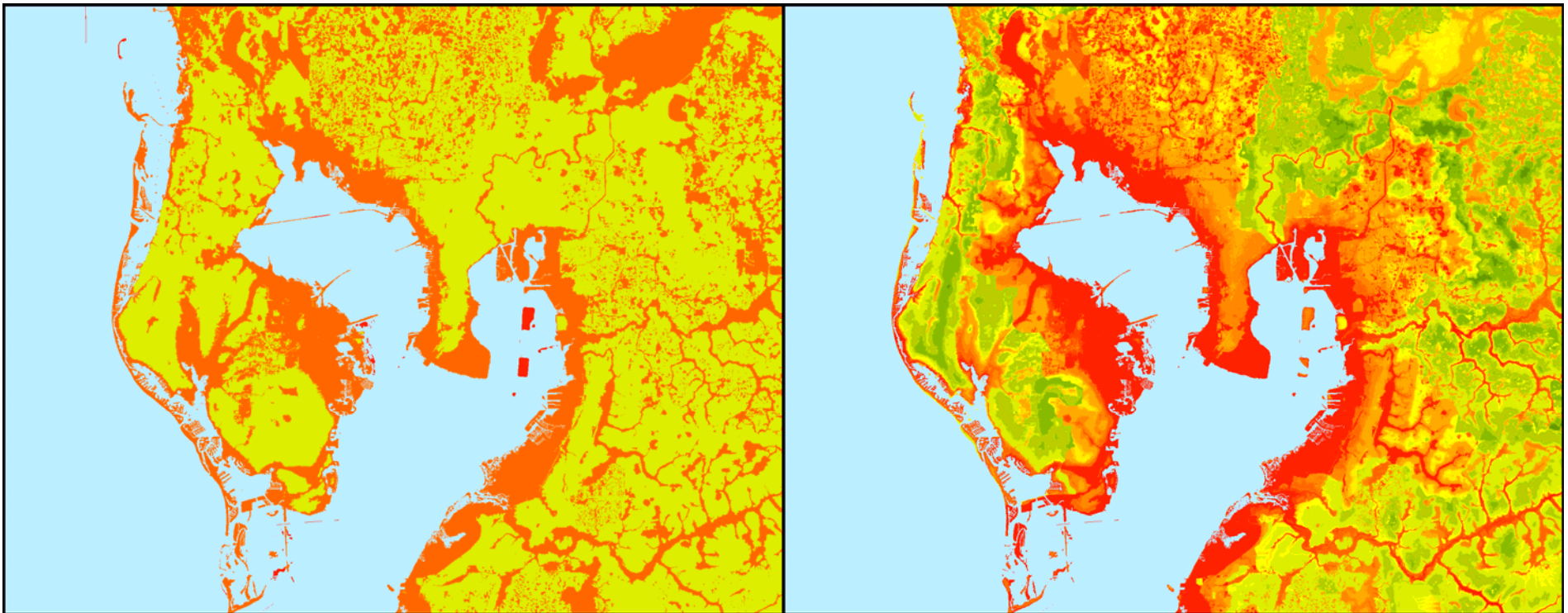
Example: Non-Hurricane Wind Risk

- **Start with Hail Days per Year**

- **Use to determine territorial definitions**

- **Then use catastrophe model output to set relativities**

Hail Days Per Year (1980–1999)

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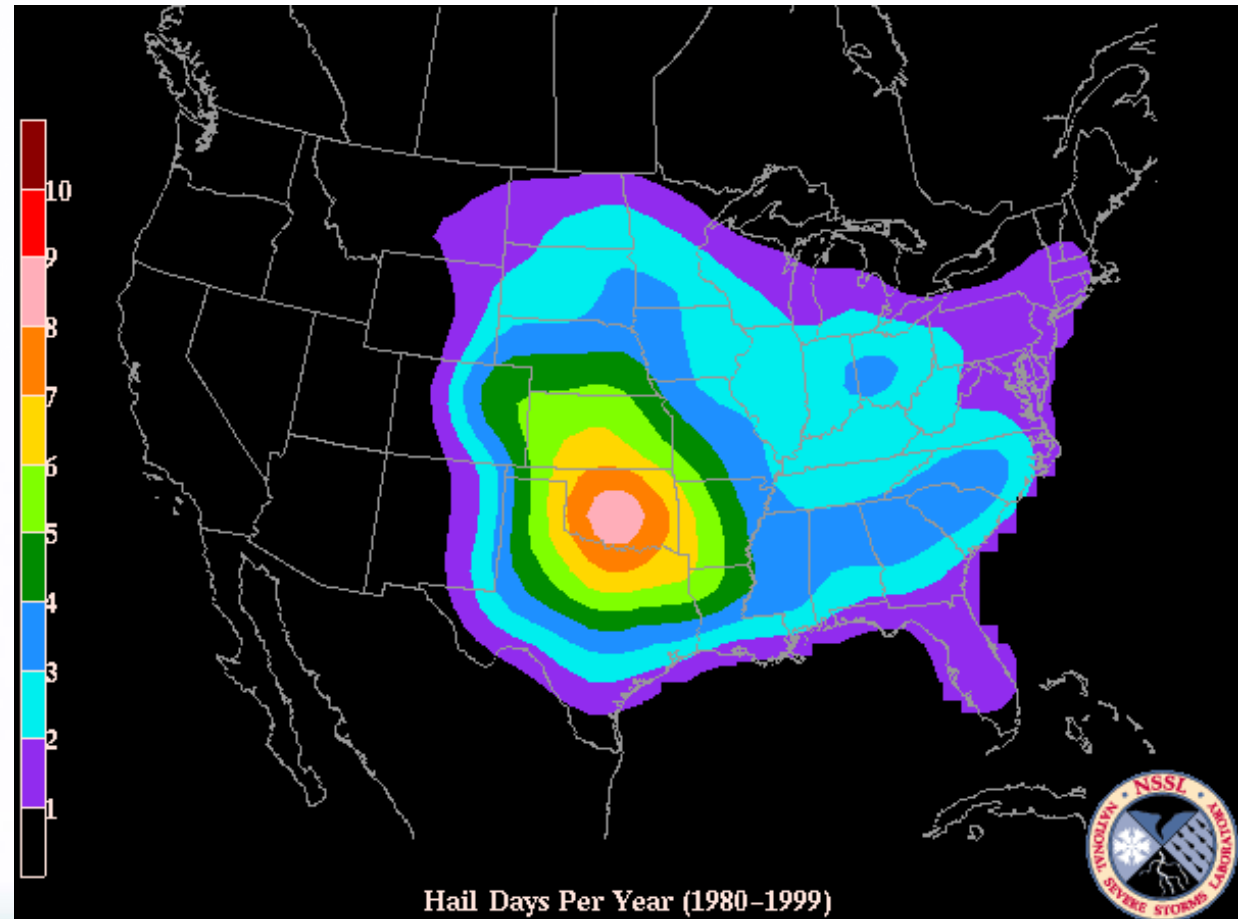
Examples of Non-Hurricane Wind Territories Based on this Approach
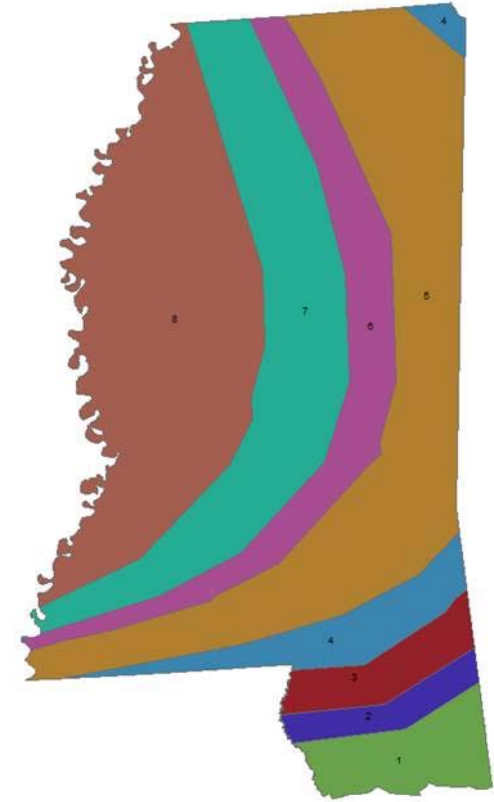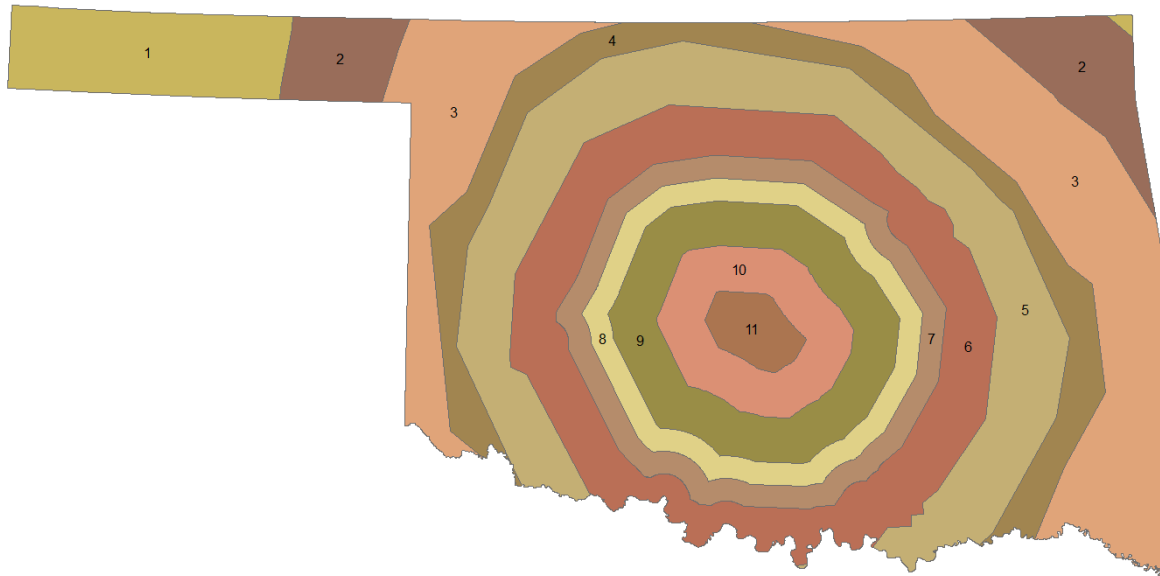
GIS Data for Other Perils

Tornado Days Per Year

Tornado Days Per Year (1980-1999)

Wind Days Per Year
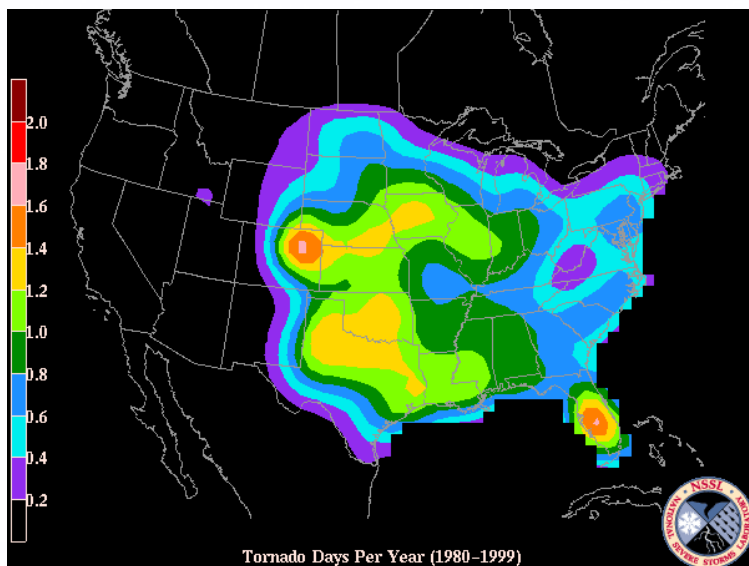
Wind Days Per Year (1980-1999)
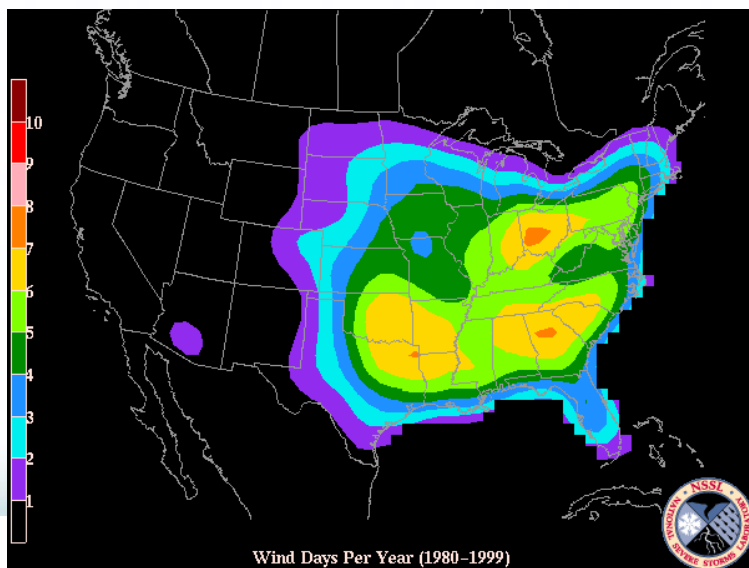
Snow Loads Pounds Per Sq. Ft

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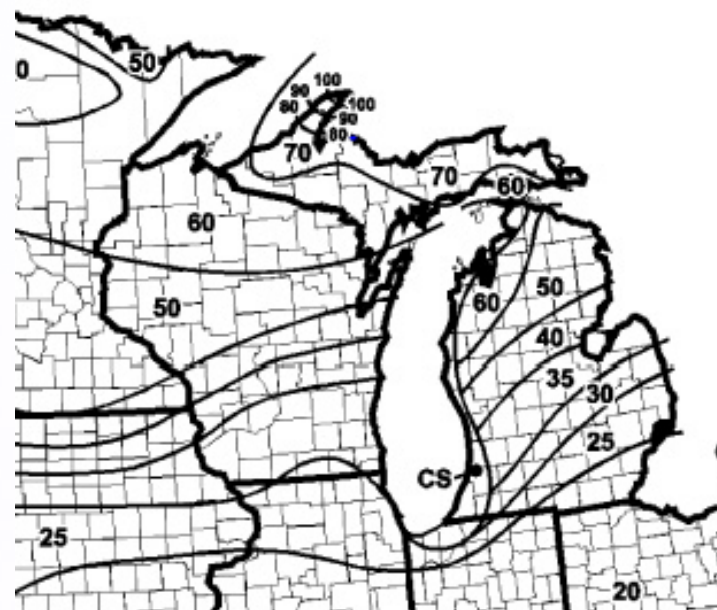
Example: Wildfire Risk

Some predictors of fire loss:
- **Length of road**
- **Slope**
- **Area of neighborhood**
- **Distance to edge of neighborhood**
- **Housing Density**
- **Distance-to-coast**
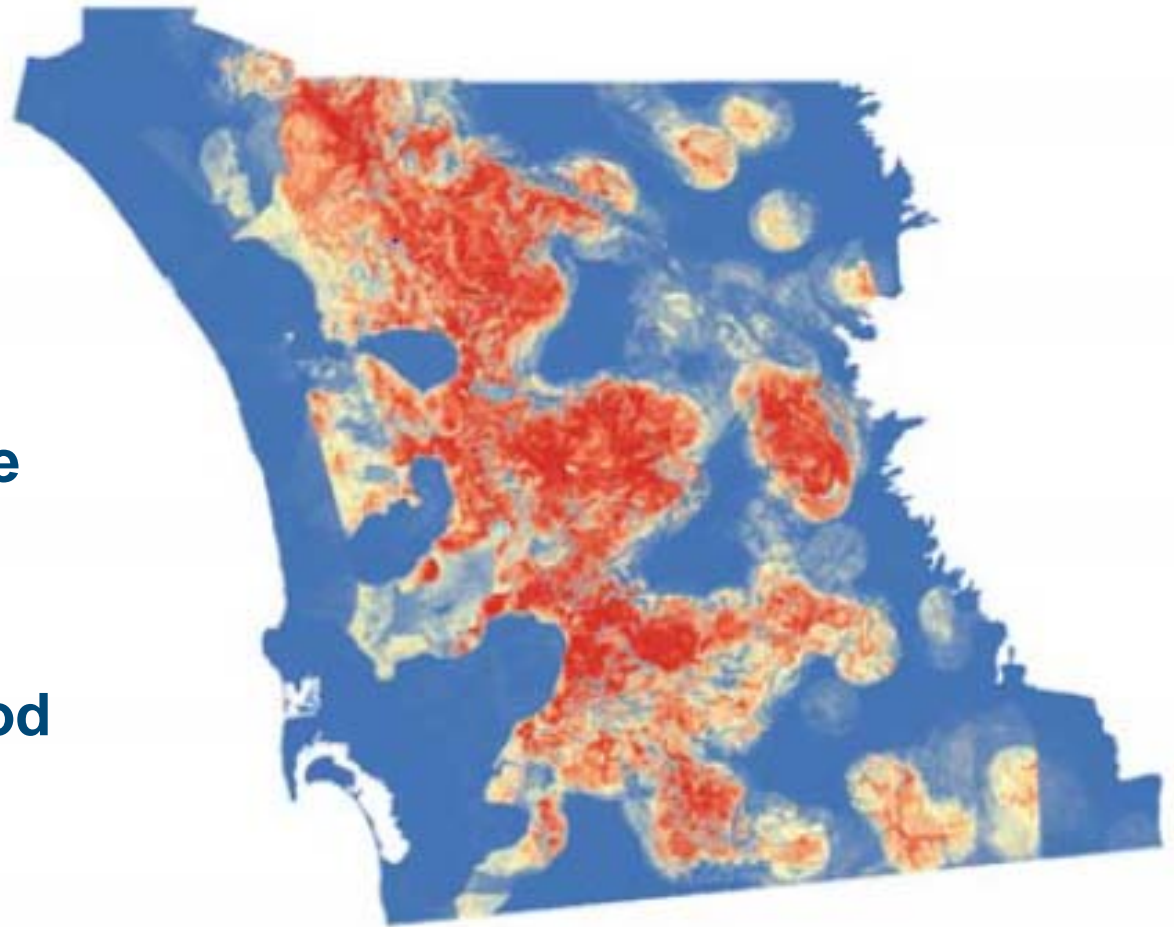
"Housing Arrangement and Location Determine the Likelihood of Housing Loss Due to Wildfire" (Syphard, et al.)

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Example: Sinkhole

Soil permeability
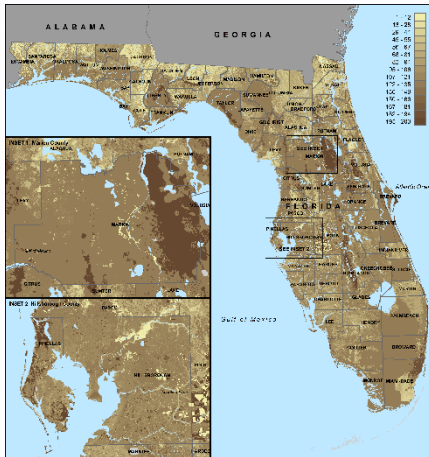
Head difference
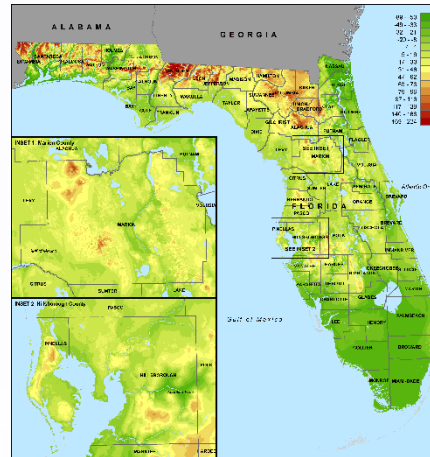
Limestone

Subsidence incident reports

Start with GIS data reflecting geological characteristics that affect sinkhole risk

Model against subsidence incidence reports to get sinkhole risk score

Use sinkhole risk score to determine ineligible locations, and combine with insurance claim data to create rates and rating territories

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Know your competition

Look at competitiveness by geography and by rating variable
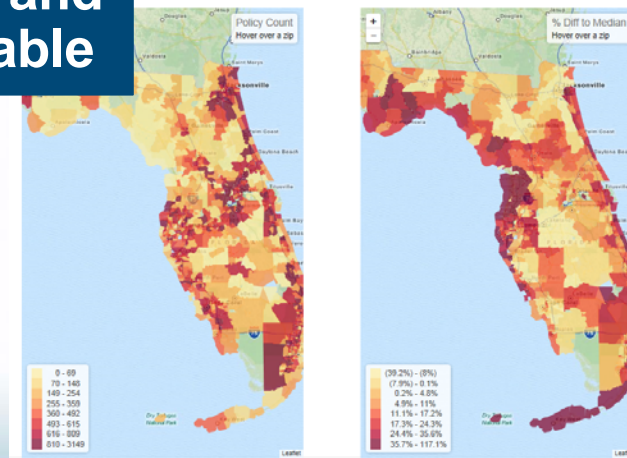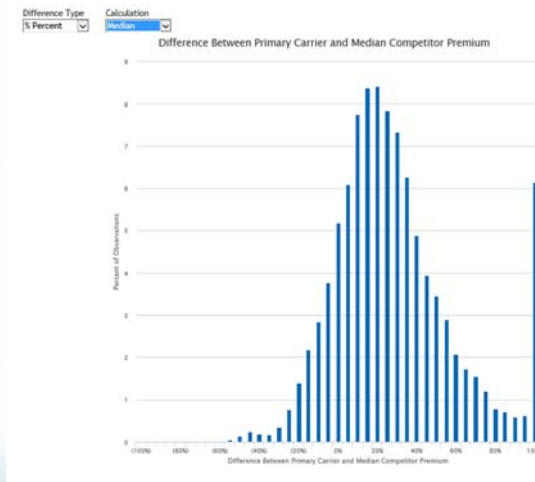
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And then get to know them even better
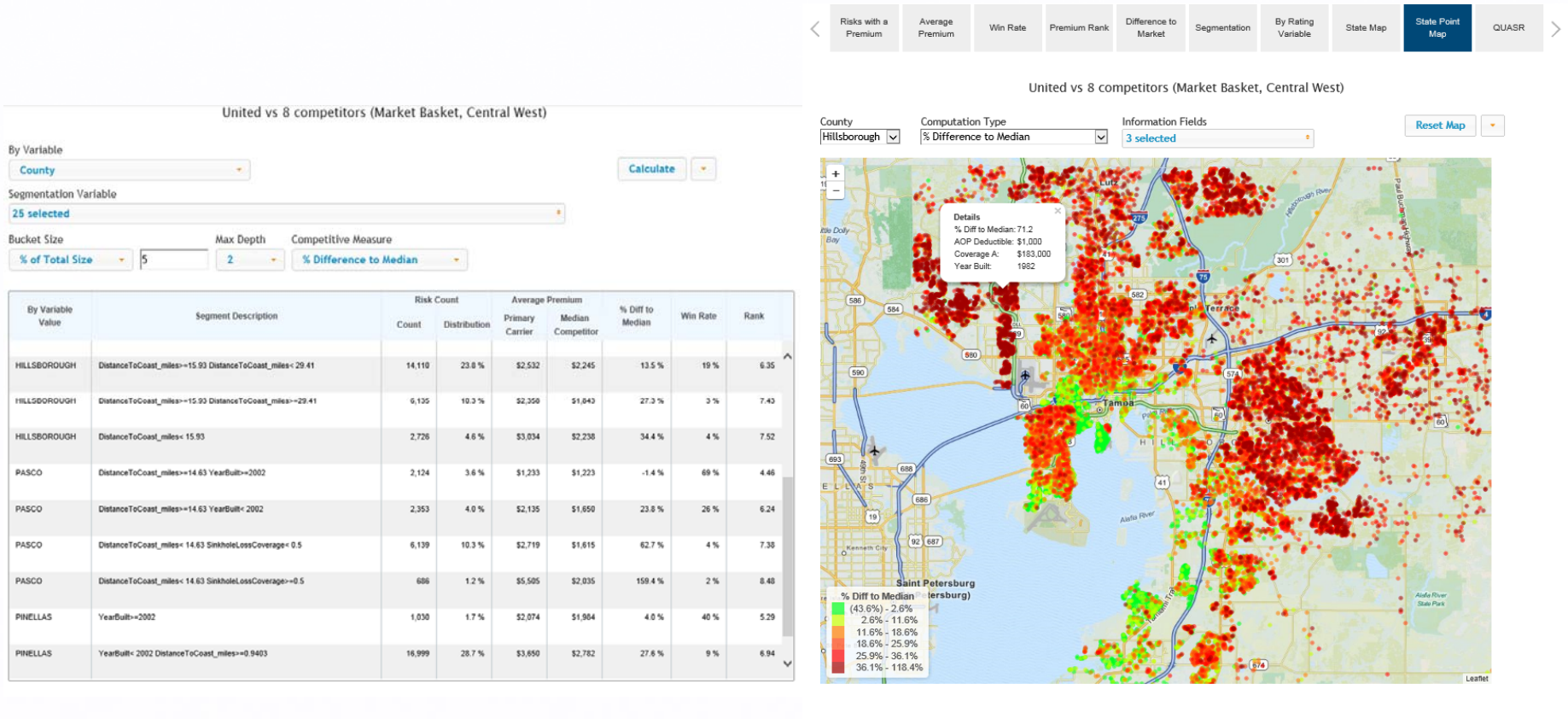
Find specific segments where you are consistently competitive

18

Identify profitable segments to target

Census Only

Census + Black Knight

34476 (Ocala)

Target Group ● Bottom 50%

Target Group ● Next 25% ● Top 25% ● Bottom 50%

Finds good risks in a generally bad ZIP

Use property-level prospect data to improve targeting

32955 (Rockledge)

Target Group ● Top 25%

Target Group ● Next 25% ● Top 25% ● Bottom 50%

Finds bad risks in a generally good zip

19

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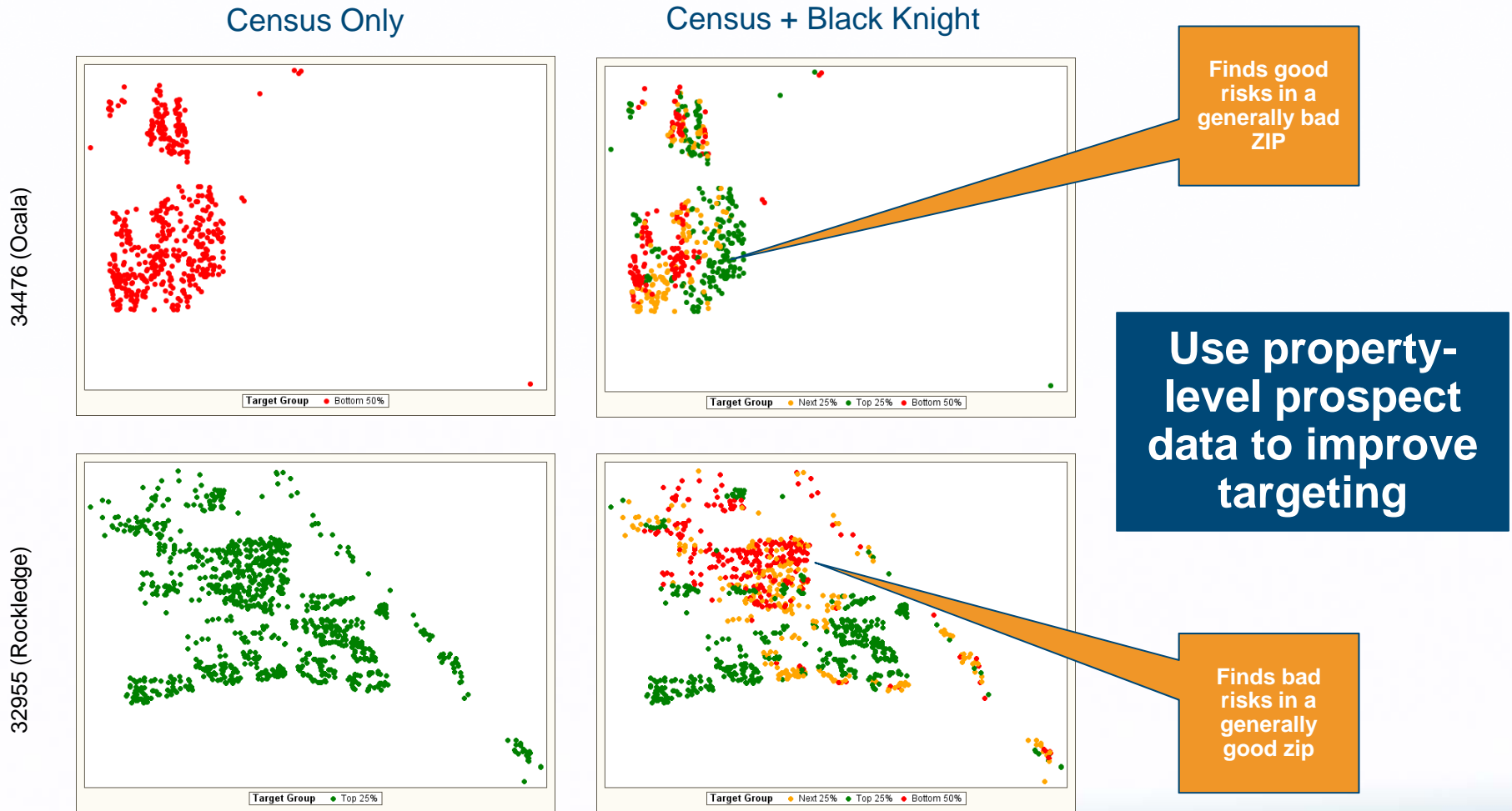
Top Predictor Variables

Black Knight

1. DwellAge
2. YearBuilt
3. Average Years Owned for ZIP
4. NoOfCars
5. EstMarketValue
6. MarkettoArea
7. EstDwellValue
8. % ZIP with Loan to Value > 100%
12. NoOfUnits
13. OutstandingLoanToMarket
18. Dwelling Value per Square Foot

Census

9. NowMarried_Pct
10. SingleMaleHouseholds_Pct
11. HomesHighCostLoan_Pct
14. CrimeIndexPersonal
15. Households60To64_Pct
16. IncomeAvgHouse
17. HousesVacant_Pct
19. HousesVacation_Pct
20. PopulationDensityAge6to12
21. PopUnder18_Pct
22. FinancialAssetsAvg

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What is Extra AOP Profit Worth?

	Census only model	With Black Knight model
Current average expected annual AOP profit	$16	$16
Average expected AOP loss cost	$278	$278
Loss Ratio Relativity of best 10%	73%	36%
Expected AOP loss cost of best 10%	$202	$101
Decrease in loss cost/Increase in annual profit	$76	$177
Expected annual profit of best 10%	$92	$193

Assumptions:
Average AOP Premium = $427
Expected AOP percent profit = 3.7%
AOP permissible loss ratio = 65%

In this scenario, the Black Knight model selects prospects with $101 higher average profit

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Put it all together
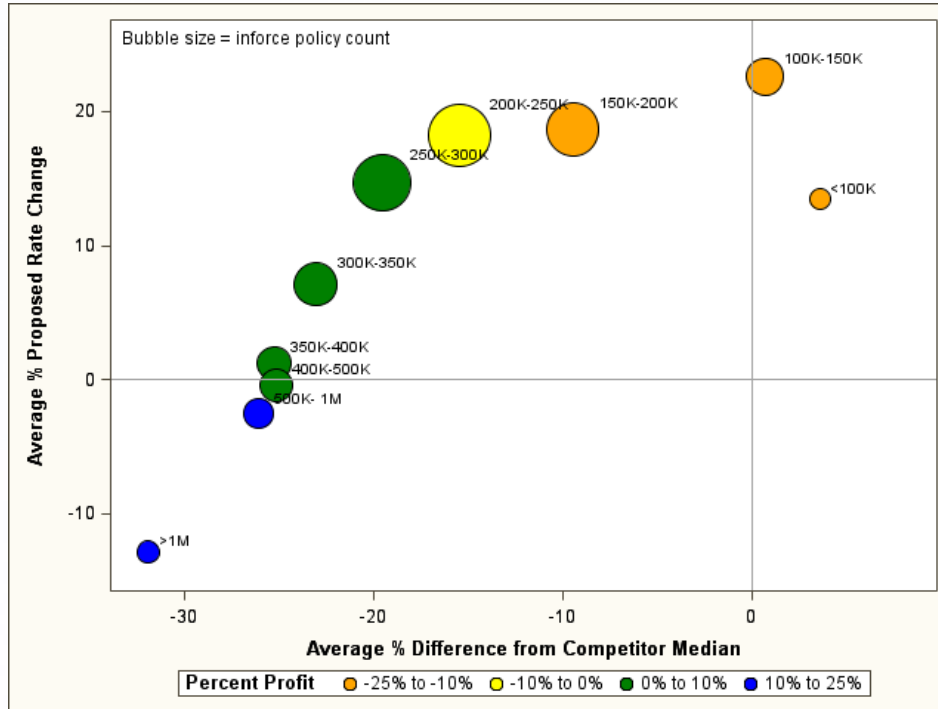
**Profitability
+ competiveness
+ market size =
opportunity**

|		Talon Retention Score Band												
		96.2%	94.8%	94.5%	93.5%	92.6%	91.1%	89.7%	87.6%	85.7%	81.6%	77.4%	64.8%	
Talon Loss Score Band		1	2	3	4	5	6	7	8	9	10	11	12	Total
82.0%	1	0.00%	0.00%	0.00%	0.05%	0.10%	0.56%	0.79%	1.07%	0.63%	0.42%	0.70%	1.71%	6.05%
56.2%	2	0.00%	0.01%	0.13%	0.55%	0.57%	1.51%	2.30%	2.73%	2.06%	1.31%	1.18%	2.56%	14.91%
43.0%	3	0.00%	0.33%	0.54%	1.09%	1.06%	1.88%	2.58%	2.01%	2.02%	1.11%	1.21%	0.65%	14.49%
31.8%	4	0.10%	0.49%	0.74%	1.34%	1.35%	2.62%	3.04%	1.37%	1.85%	0.81%	0.93%	0.42%	15.06%
30.6%	5	0.62%	0.90%	0.86%	1.61%	1.50%	2.86%	2.45%	1.11%	1.44%	0.67%	0.82%	0.32%	15.15%
28.2%	6	1.78%	1.44%	0.99%	1.81%	1.52%	2.17%	1.88%	0.71%	0.98%	0.32%	0.20%	0.03%	13.82%
26.6%	7	2.48%	1.67%	1.26%	1.91%	1.89%	2.34%	1.46%	0.75%	0.80%	0.15%	0.02%	0.00%	14.73%
19.9%	8	0.07%	0.29%	0.59%	1.44%	1.46%	1.12%	0.40%	0.26%	0.16%	0.00%	0.00%	0.00%	5.78%
36.7%	Total	5.04%	5.13%	5.11%	9.81%	9.44%	15.05%	14.89%	10.02%	9.94%	4.80%	5.06%	5.70%	100.00%

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Communicate with and monitor agents

Use scoring to monitor portfolio by agent
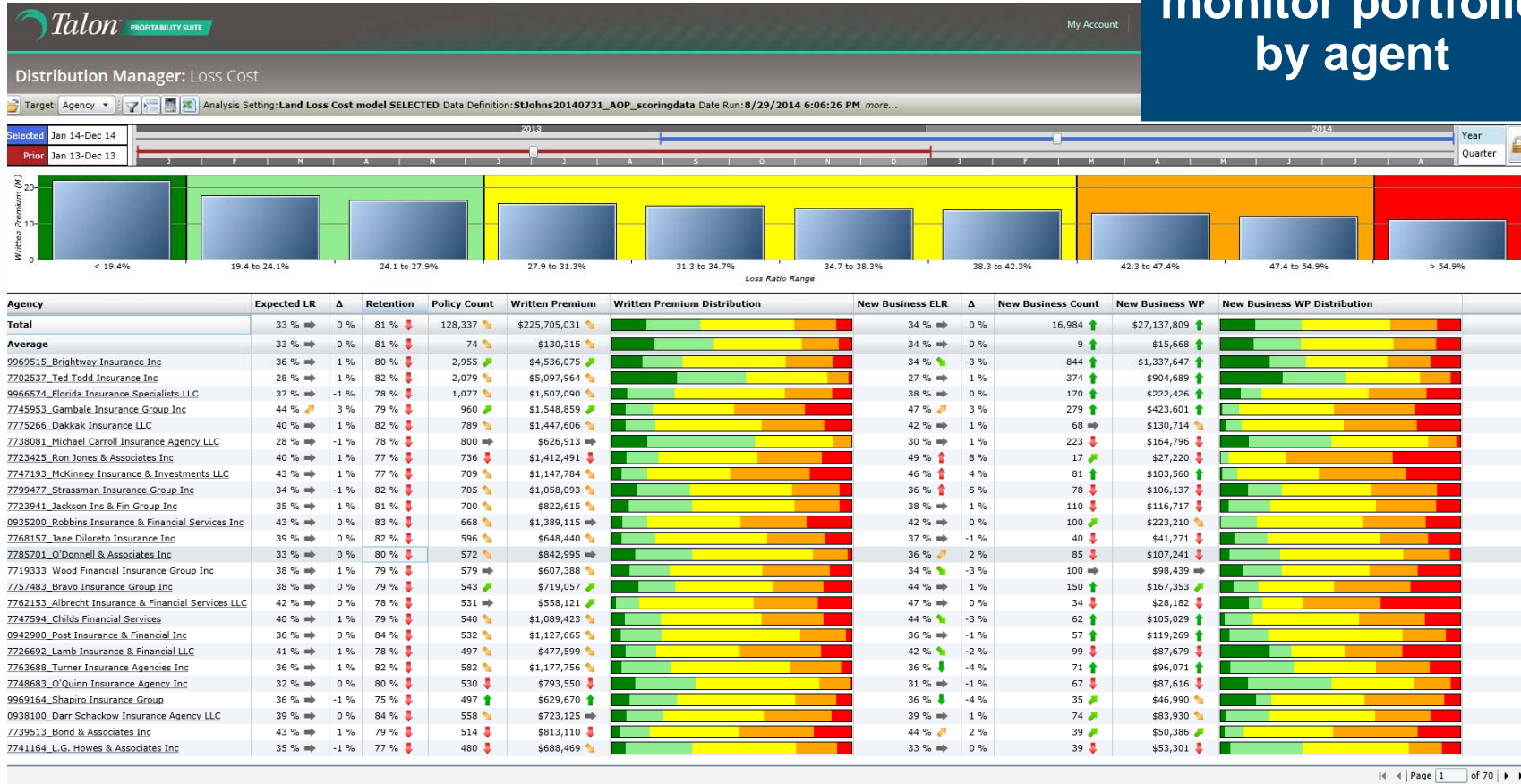
Improve your rate indications

- Rerate historical policies

- Split indications by peril

- Calculate a separate cost of reinsurance
  - Expected reinsurer profit = expected ceded premium less expected ceded loss and LAE
  - Allocate to company, state, program, line, form, peril, territory

- Enhance trend calculation

- Improve the complement of credibility

- Map results to see if they make sense

Water Relativities by ZIP

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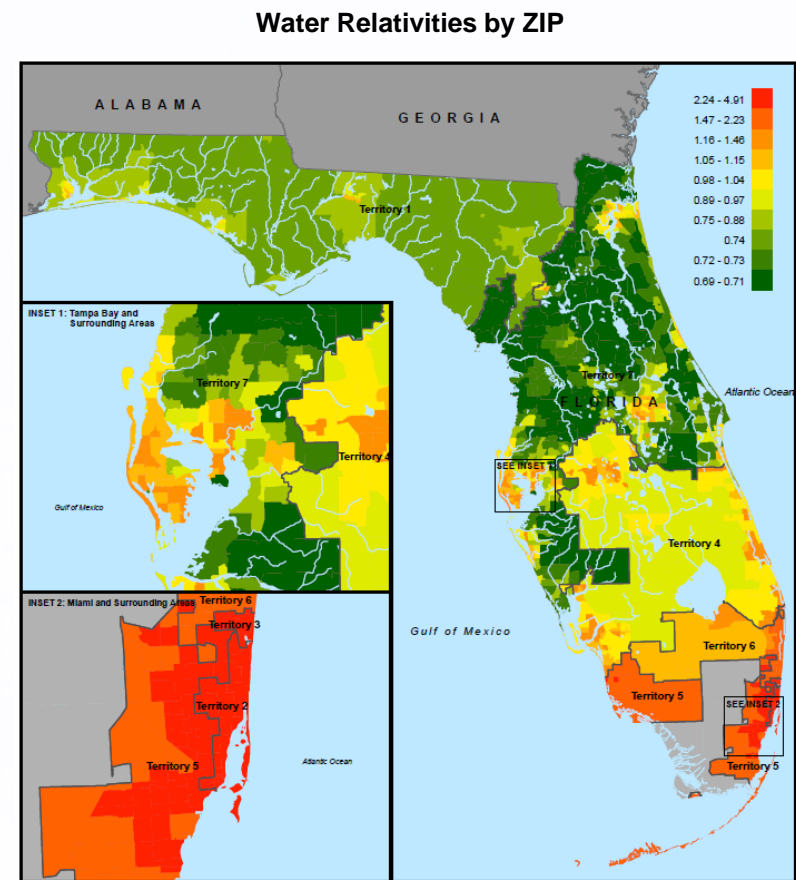
Take actions outside of rates

Marketing

Underwriting
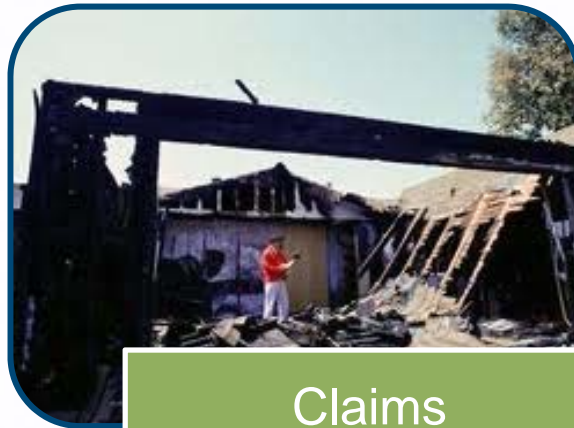
Claims

Policy administration

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Challenges for "non-large" companies

What if you don't work for AllStateFarmers?

- Credibility
- Data availability
- Systems limitations
- In-house expertise / access to technology

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Even small companies have useful data

Level of Insight (vertical axis)

Minimum sample size (Policies) (horizontal axis)

Claims to model claim severity

Policies to model claim frequency

Policies to model Renewal Rate

Quotes to model Bind Rate

Combine models to make analytic-based selections

(also known as Price Optimization)

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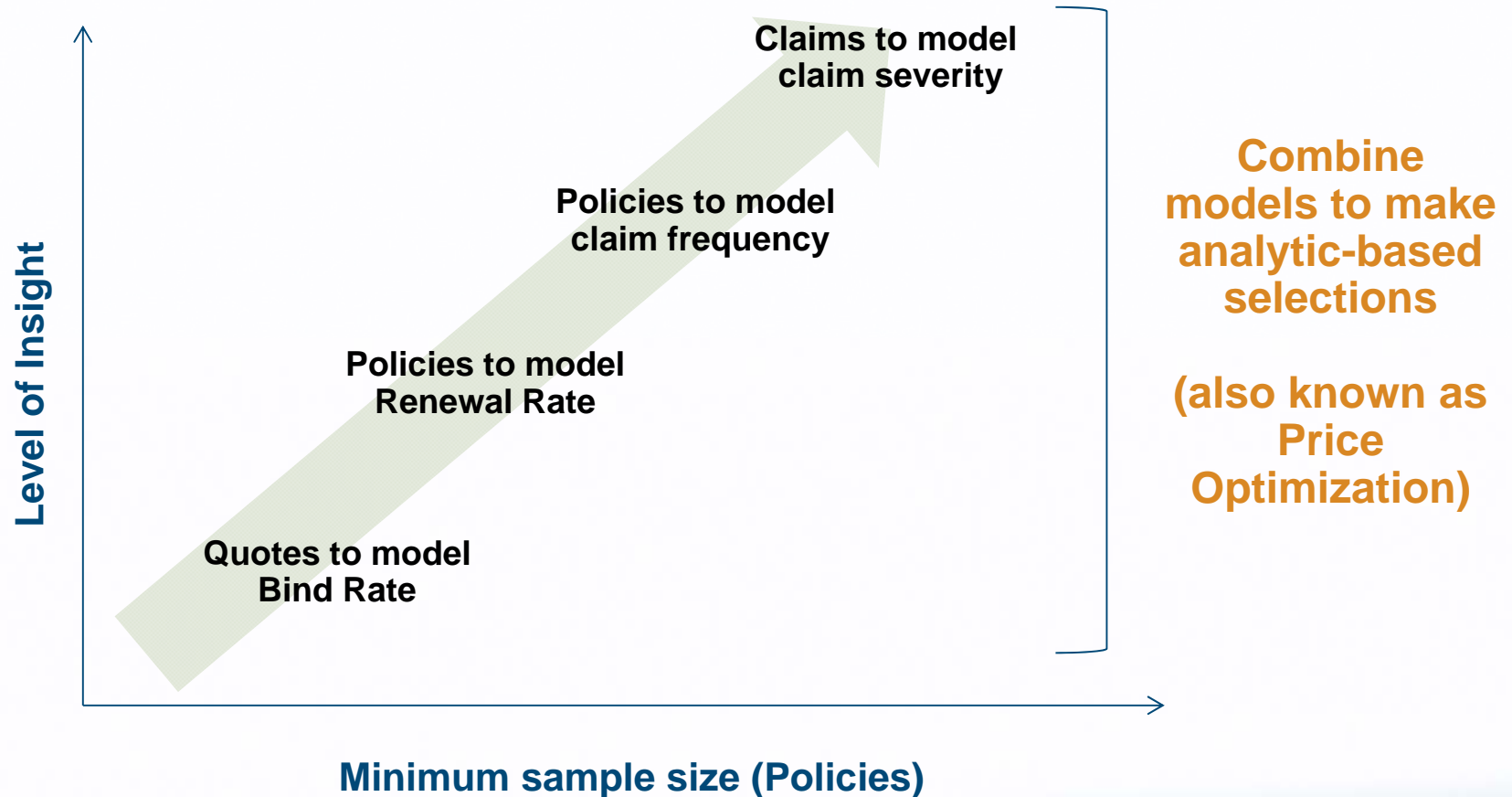
Quote Volume and Bind Rates Over Time

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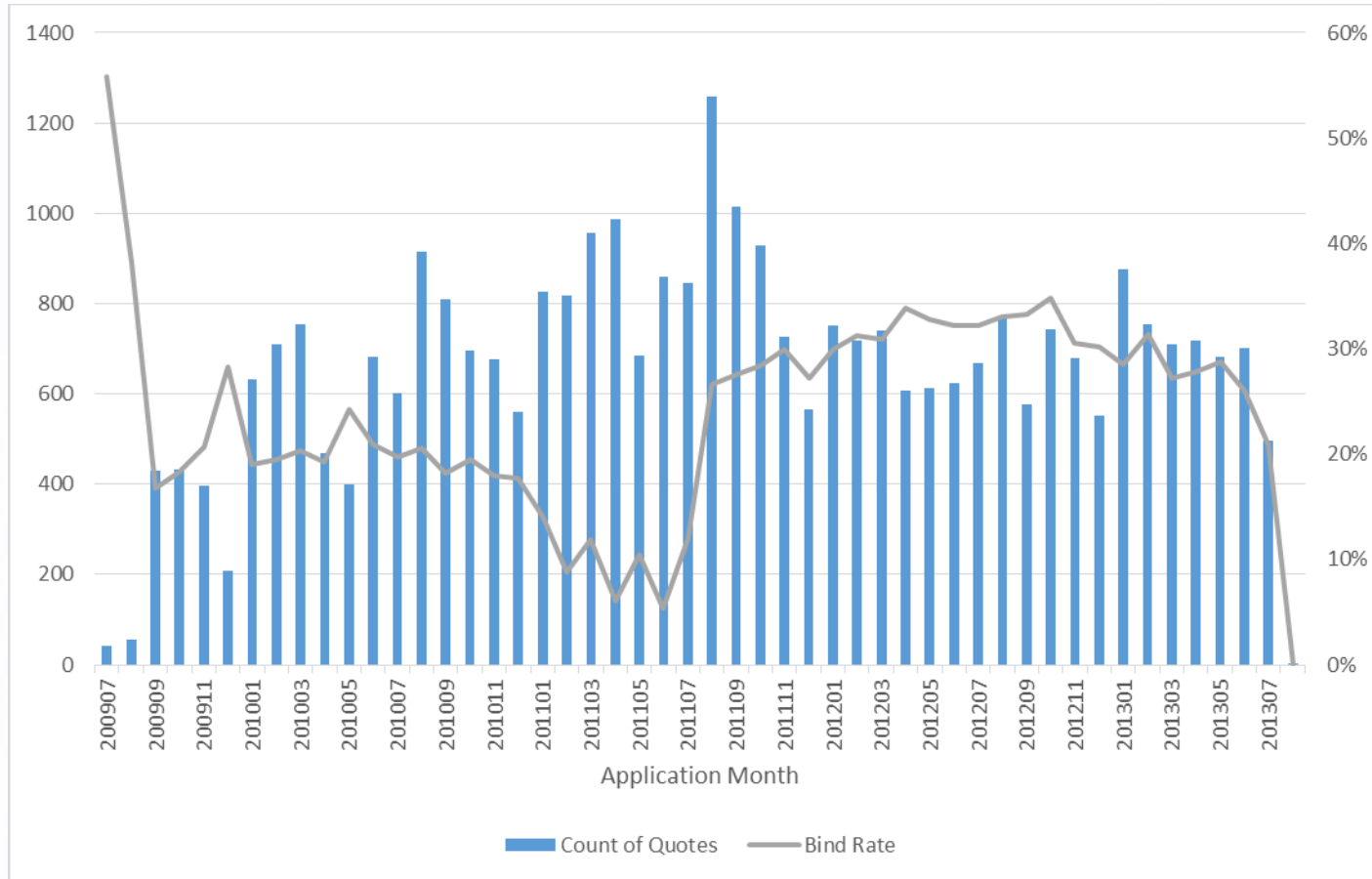
What variables correlate with bind rate?

forest1

COUNTY_GROUP
terr_group
underwritertier
priorbi_group
pdeachaccident
countofVEhicle_capped
bieachaccident
N_A_25_44
homeownerdiscount
N_AGE40_49
N_A_45_64
isstacked
N_FEMALE
N_SINGLE
N_MALE
N_drivers_capped
N_AGE25_29
N_AGE50_54
N_E_25_44
N_AGE30_34
N_AGE35_39
N_AGE55_64
N_A_21_24
N_age21_24_capped
N_age01_20_capped
N_MALE_MARRIED_40_49
N_FEMALE_MARRIED_40_49
N_AGE23_24
N_E_45_64
N_MARRIED

0   100   200   300   400

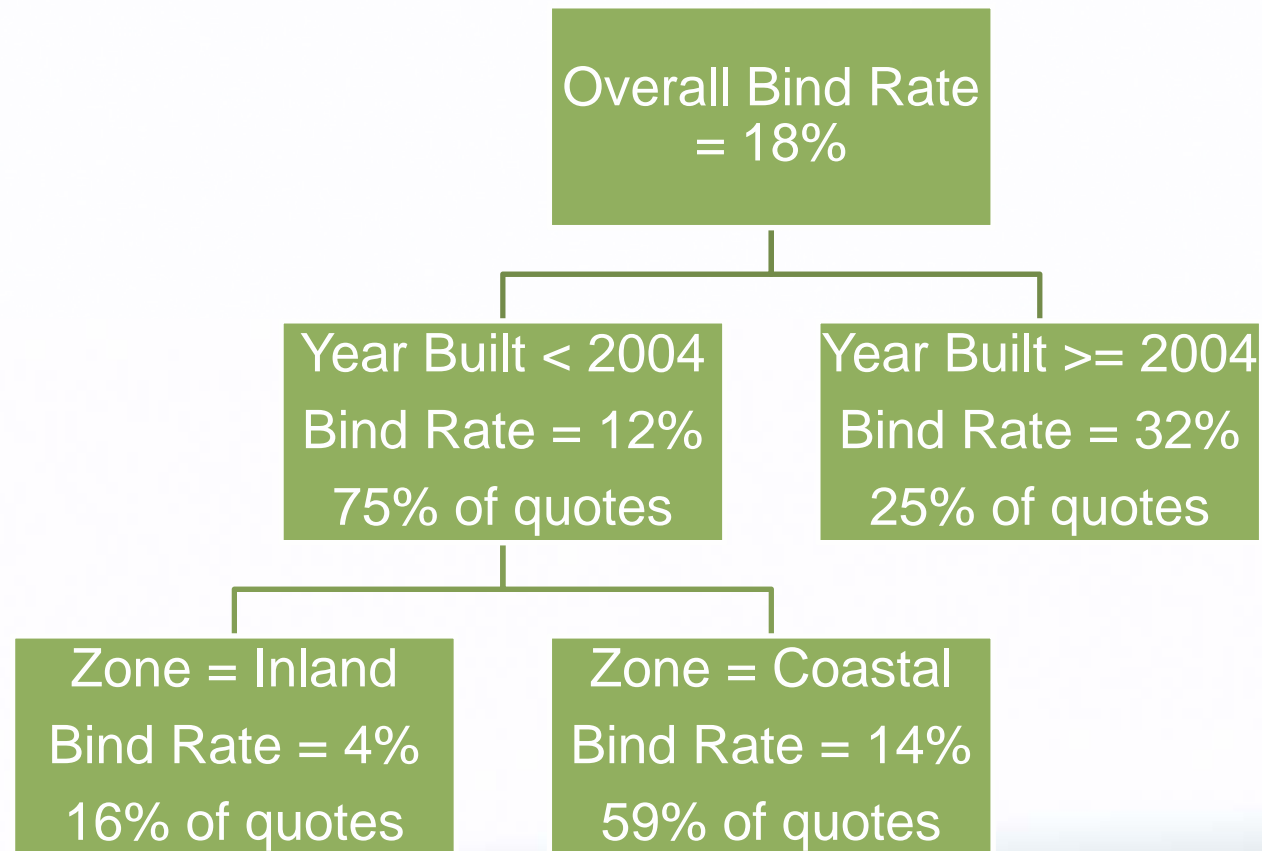MeanDecreaseGini

- In other words, what dimensions should we look into more closely?
- Can include variables not used for rating, for marketing insights
- Or limit to variables used for rating, for pricing decision support

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Example of Multivariate Segmentation

Overall Bind Rate = 18%

Year Built < 2004
Bind Rate = 12%
75% of quotes

Year Built >= 2004
Bind Rate = 32%
25% of quotes

Zone = Inland
Bind Rate = 4%
16% of quotes

Zone = Coastal
Bind Rate = 14%
59% of quotes

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Get started

- Get your pricing and underwriting right
  - Split rating algorithm, at least by major peril
  - Use GIS data and cat model output to
    - Add new rating factors
    - Redo your territories
  - Get rid of misaligned discounts and rating factors
  - Leverage competitive analysis to make selections
- Get the most from your marketing
  - Develop profitability measurements to decide where to grow
  - Identify market segments where you are competitive
  - Pinpoint individual homes to pursue where you are profitable and competitive
  - Share insights and target lists with agents

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Questions?

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415-394-3733

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